digigram

PCX881HR
PCX882HR

Professional Multichannel
Sound Cards

User manual

For technical support,
please contact your system supplier.

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DU-16800101-IS-05

INFORMATION FOR THE USER

This device complies with part 15 of FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.
This equipment has been tested and found to comply with the limits for a CLASS B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions contained in this data sheet, may cause harmful interference to radio and television communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
* reorient or relocate the receiving antenna
* increase the separation between the equipment and the receiver
* connect the equipment into an outlet on a circuit different from that of the receiver
* consult the dealer or an experienced audio television technician.

Note: *Connecting this device to peripheral devices that do not comply with CLASS B requirements or using an unshielded peripheral data cable could also result in harmful interference to radio or television reception. The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. To ensure that the use of this product does not contribute to interference, it is necessary to use shielded I/O cables.*

Warning:

Electrostatic discharge (ESD) can damage several components on the board. To avoid such damage in handling the board, take the following precautions:

Bring the device and everything that contacts it to ground potential by providing a conductive surface and discharge paths. As a minimum, observe these precautions:

- *Disconnect all power and signal sources.*
- *Place the device on a grounded conductive work surface.*
- *Ground yourself via a grounding wrist strap or by holding a grounded object.*
- *Ground any tool that will contact the device.*

IMPORTANT NOTICE

This card has been tested and found to comply with the following standards:

- International: CISPR22 Class B
- Europe: EMC 89/336/CEE (1992) specifications
- United States: FCC Rules-Part 15-Class B (digital device)

In order to guarantee compliance with the above standards in an installation, the following must be done:

- the provided cable must not be modified
- additional cables used must have their respective shield connected to each extremity

CONTENTS OF THIS PACKAGE

Thank you for purchasing a Digigram PCX sound card.

The package consists of the following components:

* a PCX881HR or PCX882HR sound card
* the User's Manual at hand

The cables are not part of this package. They are delivered separately.

Also available:

2U 19-inch breakout box allowing straightforward and secure connection to all the cards' I/Os.

FEATURES

PCX882HR and PCX881HR are audio cards for PCI bus. They are 'Universal PCI 64-bit/66 MHz', which means they can be plugged in 32-bit/33 MHz 5 V PCI slots as well as in 64-bit/66 MHz 3.3 V keyed PCI slots. The cards are also compatible with PCI-X interfaces.

PCX881HR main hardware features

- 4 AES/EBU* stereo inputs, with hardware sample rate converters (up to 96 kHz)
- 4 AES/EBU* stereo outputs (up to 192 kHz)
- 1 AES/EBU* stereo sync input (up to 192 kHz in play and record)
- 1 standard Word Clock input (up to 96 kHz)
- 1 standard Word Clock output (up to 96 kHz)
- 1 video sync input
- 1 SMPTE/LTC (Linear Time Code) sync input

PCX882HR main hardware features

All features of the PCX881HR, plus:

- 8 balanced** analog mono line inputs, with software programmable analog and digital gain
- 8 servo-balanced*** analog mono line outputs, with software programmable analog and digital gain
- 192 kHz / 24-bit converters
- Maximum level on analog inputs and outputs: +24 dBu

Note: The digital outputs always play the digital version of the corresponding analog outputs. The selection of an AES/EBU input excludes the selection of the corresponding analog inputs. Nevertheless, it is possible to simultaneously record AES and analog inputs, as long as the channels are different.

Main software features

- Real-time, simultaneous record and playback in PCM (8, 16 and 24 bits) as well as in MPEG Audio Layer I, Layer II and Layer III$^{\Phi}$, Float IEEE754 conversion supported (with 24-bit fixed-point dynamic range)
- When using the np SDK, real-time mixing of several PCM and MPEG audio streams, direct monitoring, level adjustment, panning, cross-fades, punch-in/punch-out, scrubbing, time-stretching, pitch-shifting, 3-band parametric equalizer, maximizer, format and frequency conversions
- Low latency DirectSound, Wave****, and ASIO drivers. Under DirectSound and ASIO, the cards operate in PCM mode only (nevertheless, an application can integrate coders/decoders on the host PC). Under Wave, HR boards can operate in both PCM and MPEG (layer 1 and layer 2).

$^{\Phi}$ *MPEG Layer III play-only on DSP;*
MPEG Layer III recording on the host computer is available through Digigram's PC Codec option using the np SDK

---

* *can be used as S/PDIF interface as well*

** *can be used with unbalanced signals*

*** *Electronically servo-balanced outputs provide automatic level adjustment to accommodate either balanced or unbalanced lines*

**** *Windows XP and Server 2003 only; for Windows Vista, a Wave driver is available on request.*

REQUIREMENTS

Minimum hardware requirements

One free PCI or PCI-X slot (5 V or 3.3 V)
CPU power and memory required depend on the operating system and on the audio application used.

Software requirements

To use your PCX881e or PCX882e, install the driver from the HR Runtime package version 1.40 (Vista: 1.60) or higher. This package includes:

- a Digigram np driver enabling OEM applications to best capitalize on the boards
- a WDM DirectSound driver
  Microsoft DirectX 9 or higher must be installed on your computer.
- a Wave driver* (32 bits, installation optional)
- an ASIO driver (32 bits, installation optional)

Note: the HR Runtime package for Windows Vista does not include a Wave driver. In case your audio application explicitly requires a Wave interface, a Wave driver is available on request. In this case, please contact Digigram.

Supported operating systems

PCX881HR and PCX882HR cards run under Windows XP, Windows Server 2003, Windows Server 2008, Windows Vista and Windows 7.

HARDWARE INSTALLATION

The card has to be installed in the computer prior to installing its driver.

Installing the card

Gently plug the card in a free PCI slot and press it down to position it firmly. Tighten the screw.

Interrupt and memory address

Hardware interrupt and addresses are automatically set up at start-up by the PCI PnP BIOS.

* *Windows XP, and Server 2003 only*

SOFTWARE INSTALLATION

Note: *the installation of the software requires administrator rights on your computer*

Please visit the Digigram web site at **www.digigram.com** for the most recent driver.

In case you run a specific application developed or installed by a Digigram Partner, this application might require the use of a specific driver version. In this case, make sure that the updated driver has been approved by your supplier.

Standard installation under Windows XP, Windows Server 2003, Windows Server 2008, Windows Vista, and Windows 7

If the driver has been downloaded from our web site, it has to be expanded prior to the driver's installation as follows: double-click on the downloaded file (self-expanding). You can use the default destination location (Windows temporary folder) or select another directory.

Important note*: this default procedure installs the 'Digigram Hardware Settings' control panel. This application allows the configuration of the hardware resources of Digigram cards for all audio applications. The DHS allows for instance to define the clock of the card, the input source, input and output analog and digital gain, Sample Rate Converters, digital output format, etc...*
Please note that, with the DHS installed, controls available through the DirectSound control panel are limited to:

- *Volume control for input and output*
- *Wave control*

Under Windows XP and Server 2003 you may also install the driver without installing the DHS control panel, and in this case more controls are available through the DirectSound control panel:

- *Volume control for input*
- *Wave control*
- *Monitoring control*
- *Analog input level*
- *Digital input level*
- *Clock selection: AES Sync, AES1, Word Clock*
- *Digital output format: professional, consumer*

*To do so, install the driver with the command line: "**setup x_topology**" (not available under Windows Vista). For detailed information, please refer to the dedicated document on our web site.*

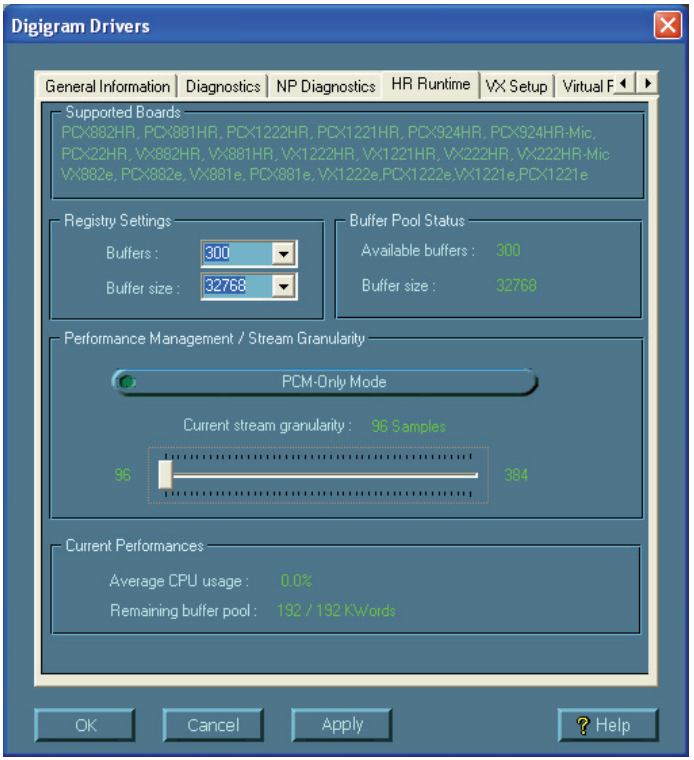
- Shut down your computer and insert your PCX card.
- Restart your computer.
- Click on Cancel if the **Found New Hardware** Wizard appears.
- Double-click on the **HR Runtime vxx.msi/HR Runtime vxx.msi for Vista** icon to launch the driver installation.
- A welcome message is displayed, click **Next** to continue.
- The "**License Agreement**" window appears: read it, and click on ***"I accept the terms in the license agreement"*** to approve it.
- Do the same in the next window for Virtual PCX and PC Codec Legal Notice.
- In the **"Custom Setup"** window, the "*Drivers for the HR boards*" are displayed; by default, both WDM DirectSound and ASIO HR are installed.
  To install the Wave driver*, select '**Wave**'.
  Next.
- In the "Ready to Install the Program Window", click on Install to start copying the files.
  - *Note: In case you use an unsigned driver version, the "Digital Signature Not Found" message may appear because a non-Microsoft software is about to be installed.*
    *Click on **Continue** in the **"Hardware installation"** window (Windows XP, Server 2003).*
- *Under Windows Vista:*
  *Click **Allow** in the "**User Account Control**" window.*
  *Click **Install** in the "**Windows Security**" window.*
- In the **"Digigram drivers"** window, select the number and the size of buffers required by your applications. Click on **Ok**.
- Click **Finish** to complete the driver installation.

Parameterizing the ASIO driver

Note: for most current ASIO and Wave applications (e.g. Cubase, Nuendo, Winamp, etc...) you have the choice between a 32-bit version and a 64-bit version when installing them under Windows ≥ Vista. For operation with your PCX sound card, make sure to use the 32-bit version!

* *Windows XP and Server 2003 only; for Windows Vista, a Wave driver is available on request.*

To use the ASIO driver on your PCX HR sound card, the option **"PCM only"** has to be activated in the Digigram control panel (CPL). To access this control panel, go to **<Start>**, **<Programs>**, **<Digigram>**, **<Digigram Control Center>**. For detailed information on how to use the Digigram control panel, please refer to its online help (**"? Help"** button).



Parameterizing the Wave driver

In the case of an application managing exclusively PCM audio, the latency of the Wave driver can be optimized activating the option **"PCM only"** in the Digigram control panel (CPL). With this option enabled, the latency of the Wave driver is optimized (in this case the PCX HR on-board MPEG encoding/decoding is disabled). To access this control panel, go to **<Start>**, **<Programs>**, **<Digigram>**, **<Digigram Control Center>**. For detailed information on how to use the Digigram control panel, please refer to its online help (**"? Help"** button).

Removing the driver under Windows XP and Windows Server 2003

- Open the **Windows Control Panel** and double-click on the **Add/Remove Software** icon.
- Select ***"Digigram HR Runtime …"***, and **Change/Remove**.
- Select **Remove** in the HR Runtime window.
- Follow the instructions to finish to remove the driver.

Removing the driver under Windows Server 2003, Windows Server 2008, Windows Vista, and Windows 7

- Open the **Windows Control Panel** and double-click on the **Programs and Features** icon.
- Select ***"Digigram HR Runtime for Vista…"***, and **Change/Remove**.
- Select **Remove** in the HR Runtime window.
- Follow the instructions to finish removing the driver.

How to check the installation

Once the cards and the driver have been installed according to the procedure described in this manual, you can verify that the card is properly installed and works fine as follows:

- Menu **<Start> <Settings> <Control panel>**, **<Sound and Multimedia>**, tab **"Audio"**, **Default device** (Playback device, Recording device). The card's channels can be selected. The card can be used with any *DirectSound* application.
  Available WDM devices are:
  - PCX881HR (PCX882HR) 1+2 (WDM) (*record and playback*)
  - PCX881HR (PCX882HR) 3+4 (WDM) (*record and playback*)
  - PCX881HR (PCX882HR) 5+6 (WDM) (*record and playback*)
  - PCX881HR (PCX882HR) 7+8 (WDM) (*record and playback*)
  - PCX881HR (PCX882HR) 5.1 (WDM) (*record and playback*)
  - PCX881HR (PCX882HR) 7.1 (WDM) (*record and playback*)
- The card is also visible via the np interface: go to **<Start> <Programs> <Digigram>** and select **<Digigram Control Center>**.
  - In the **"Digigram drivers"** window, select the '**General Information**' tab.
    In the **"Modules Information"** window, you can see the **HR Runtime** modules that have been installed, and their versions.

- In the **"Digigram drivers"** window, select the **'Diagnostics'** tab. You should see here the icons of the cards you have installed.
- If the card you have installed is listed:
  - Right click on the icon of the card.
  - Select **'Diagnostics'**, and ***Play Sine***. This plays in loop a sine signal on the outputs of the card. You can also select ***Play file*** to play in loop a file of your choice (PCM only).
    If the playback is correct, the card is correctly installed and works.
  - To stop the playback, right click on the card icon, and select ***Stop Activities***.
- If the card is not displayed:
  - Make sure that during the HR runtime installation the **"Driver for the HR boards"** has been selected in the **"Select components"** window.
  - Make sure that the card is correctly inserted in the PCI slot, and screwed on the PC chassis.
  - If necessary, uninstall the HR runtime package as described in this manual, and re-install it.
- If the Wave driver has been installed[•]:
  - Go to menu **<Start>**, **<Settings>**, **<Control panel>**, **<Sound and Multimedia>**, tab "**Audio**", **Default device** (**Playback device, Recording device**). The card's channels can be selected. The card can be used with any Wave application.
    Available Wave recording and playback devices are:
    - PCX881HR (PCX882HR) 1+2 (Wave) (*record and playback*)
    - PCX881HR (PCX882HR) 3+4 (Wave) (*record and playback*)
    - PCX881HR (PCX882HR) 5+6 (Wave) (*record and playback*)
    - PCX881HR (PCX882HR) 7+8 (Wave) (*record and playback*)
    - PCX881HR (PCX882HR) 5.1 (Wave) (*record and playback*)
    - PCX881HR (PCX882HR) 7.1 (Wave) (*record and playback*)
    - PCX881HR (PCX882HR) 5.1+2 (Wave) (*record and playback*)
- If the ASIO driver has been installed:
  - The card is visible from any ASIO application.

Note:
5.1 plays on outputs 1, 2, 3, 4, 5, 6
7.1 plays on outputs 1, 2, 3, 4, 5, 6, 7, 8
5.1+2 plays on outputs 1, 2, 3, 4, 5, 6, 7, 8

[•] *Windows XP and Server 2003 only; for Vista, a Wave driver is available on request.*

The 'Digigram Hardware Settings' ('DHS') control panel

Digigram Hardware Settings (DHS) is an application allowing to configure the hardware resources of Digigram cards for all audio applications using them. This application is installed by default with the driver unless the command line "*setup x_topology*" has been executed to install the driver.
A resource being managed by the DHS application can not be modified by any other applications. To enable an audio application to modify a Digigram card resource, this resource must not be managed by the DHS.

Note: As soon as a resource of a card is managed by the DHS, the clock selection of this card MUST be defined in the DHS.

The DHS allows to:

- Select the clock the card uses
- Select of the input source
- Adjust analog and digital gains of inputs and outputs
- Enable Sample Rate Converters of an input
- Select the input monitored on an output
- Set the monitoring gains
- Define the digital output format

For more detailed information on how to use this control panel, please refer to its on-line help.

SPECIFICATIONS

Configuration

	PCX881HR	PCX882HR
Bus/Format	64-bit/66 Mhz Universal PCI master mode, PCI-X compatible	
Digital Signal Processor	Motorola 56321 at 240 MHz	
RAM	512 kWords	
Size	175 mm × 99 mm x 20 mm	
Power requirements (+3.3V/+5V / +12V / –12V)	0 A / 0.6 A / 0.1 A / 0 A	0 A / 0.7 A / 0.5 A / 0.2 A
Operating: temp / humidity (non-condensing)	0°C/+50°C • 5%/90%	
Storage: temp / humidity (non-condensing)	-5°C/+70°C • 0%/95%	

Inputs

	PCX881HR	PCX882HR
Analog line inputs (mono)	-	8 balanced*
Maximum input level/ impedance	-	+24 dBu/ >10 kΩ
Digital inputs (stereo)	4 AES/EBU** with hw Sample Rate Converters, 1:3 to 3:1, up to 96 kHz	
Programmable input gain	digital: from –110 dB to +18 dB	analog: from –94.5dB à +15.5 dB⊗ digital: from –110 dB à +18 dB
Other inputs	AES/EBU Sync (up to 192 kHz), Word clock (up to 96 kHz), LTC, Video	
AES11 synchronization	Yes	

* *can be used with unbalanced signals*
** *can be used as S/PDIF interface as well*
⊗ *maximum sensitivity: 0 dBFs for –15.5 dBu input*

Outputs

	PCX881HR	PCX882HR
Analog line outputs (mono)	-	8 servo-balanced***
Maximum output level / impedance	-	+24 dBu / <100 Ω
Digital outputs (stereo)	4 AES/EBU**, up to 192 kHz	
Programmable output gain	digital: from –110 dB to +18 dB	analog: from –86 dB to +24 dB digital: from –110 dB to +18 dB
Other outputs	Word clock (up to 96 kHz)	

Connectors

	PCX881HR	PCX882HR
Internal connectors	Inter-board Sync and Companion Board Link	
External connector	62-pin Sub-D	
Digigram accessories available	Breakout cable or 2U 19" Breakout Box	

Audio specifications

	PCX881HR	PCX882HR
Sampling frequencies available	Programmable from 22.05 to 192 kHz	Programmable from 8 to 192 kHz
A/D and D/A converter resolution	-	24 bits
Supported audio formats	MPEG, PCM (8, 16, 24 bits), Float IEEE754	

*** *electronically servo-balanced outputs provide automatic level adjustment to accommodate either balanced or unbalanced lines*

Audio performance

measured at Fs=48 kHz

	PCX881HR	PCX882HR
Frequency response (record + play)	-	20 Hz–20 kHz: ±0.2 dB
Channel phase difference: 20/20kHz	-	<0.2°/2°
Dynamic range (A-weighted)	-	Analog In: >104 dB Analog Out: >104 dB
THD + noise 1 kHz at –1 dBfs	-	Analog In: <–97 dB Analog Out: <–94 dB
Crosstalk (Analog in or out)	-	1 kHz at 24 dBu: <–100 dB 15 kHz at 24 dBu: <–85 dB

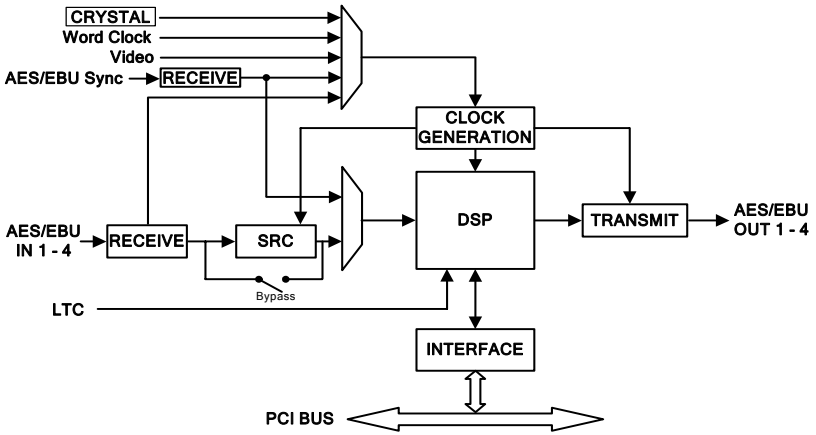
Development environments

	PCX881HR	PCX882HR
Digigram management	np SDK (HR Runtime, PCM & MPEG)	
Other management	Wave* (PCM & MPEG Layer I & II), ASIO, and DirectSound (PCM)	
OS supported	Windows XP, Windows Server 2003, Windows Server 2008, Windows Vista, and Windows 7	
Main on-board processing features (with np SDK)	PCM play & rec, MPEG Layers I & II play & rec, Layer III play, Float IEEE754, direct monitoring, real-time mixing, level adjustment, panning, cross-fade, punch-in/punch-out, scrubbing, time-stretching, pitch-shifting, 3-band parametric equalizer, maximizer, format and frequency conversions	

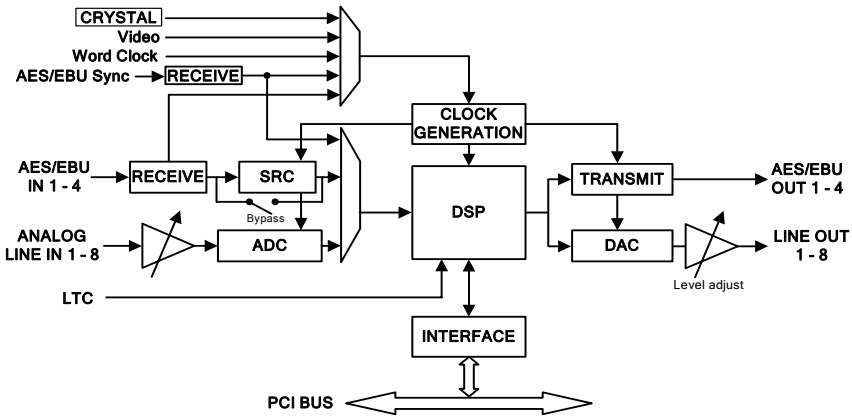
* *Windows XP, and Server 2003 only; for Windows Vista, a Wave driver is available on request.*

APPENDICES

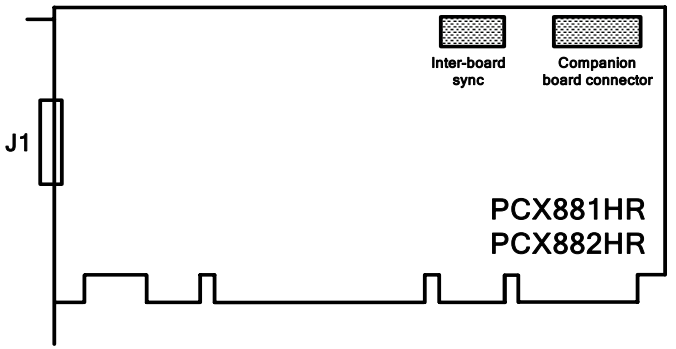
PCX881HR schematic diagram



PCX882HR schematic diagram



Layout

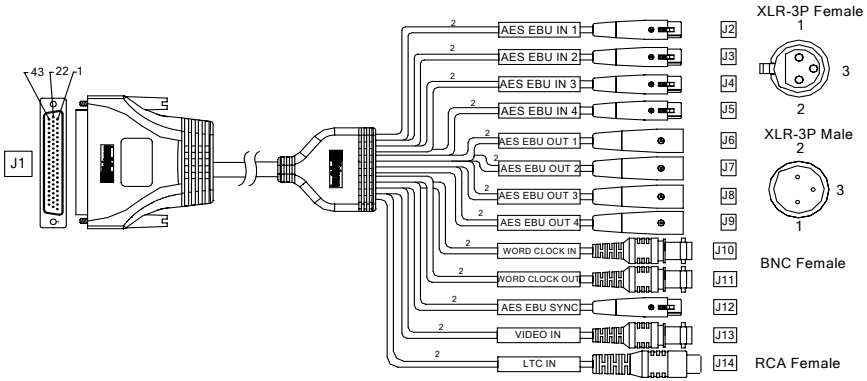


J1:

- Digital cable (PCX881HR)
- Analog/digital cable (PCX882HR)

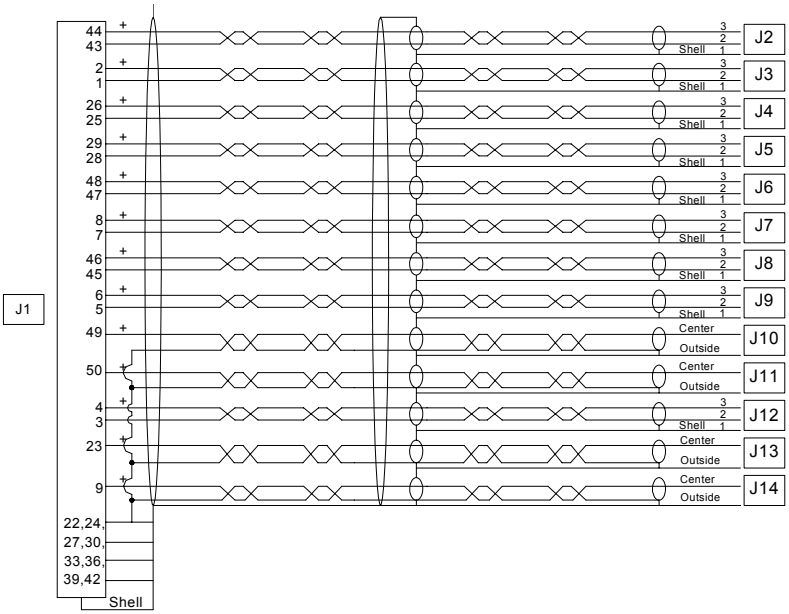
PCX881HR cable diagram

Schematic diagram of the cable delivered by Digigram*:



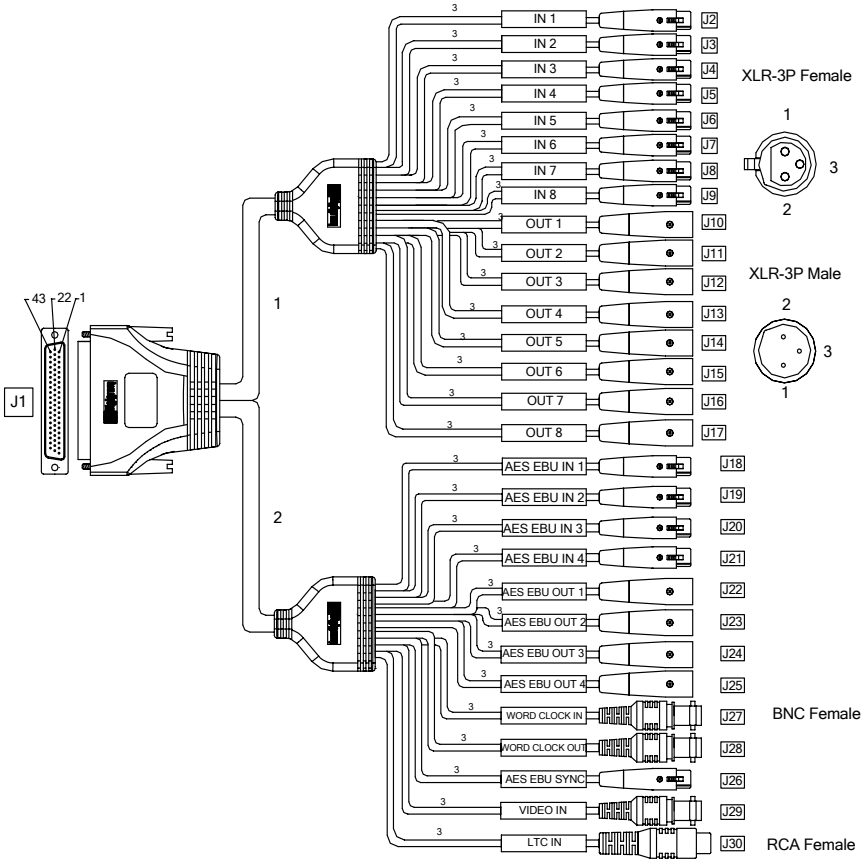
* Your cable may look different if it is not a Digigram cable.

PCX881HR wiring diagram



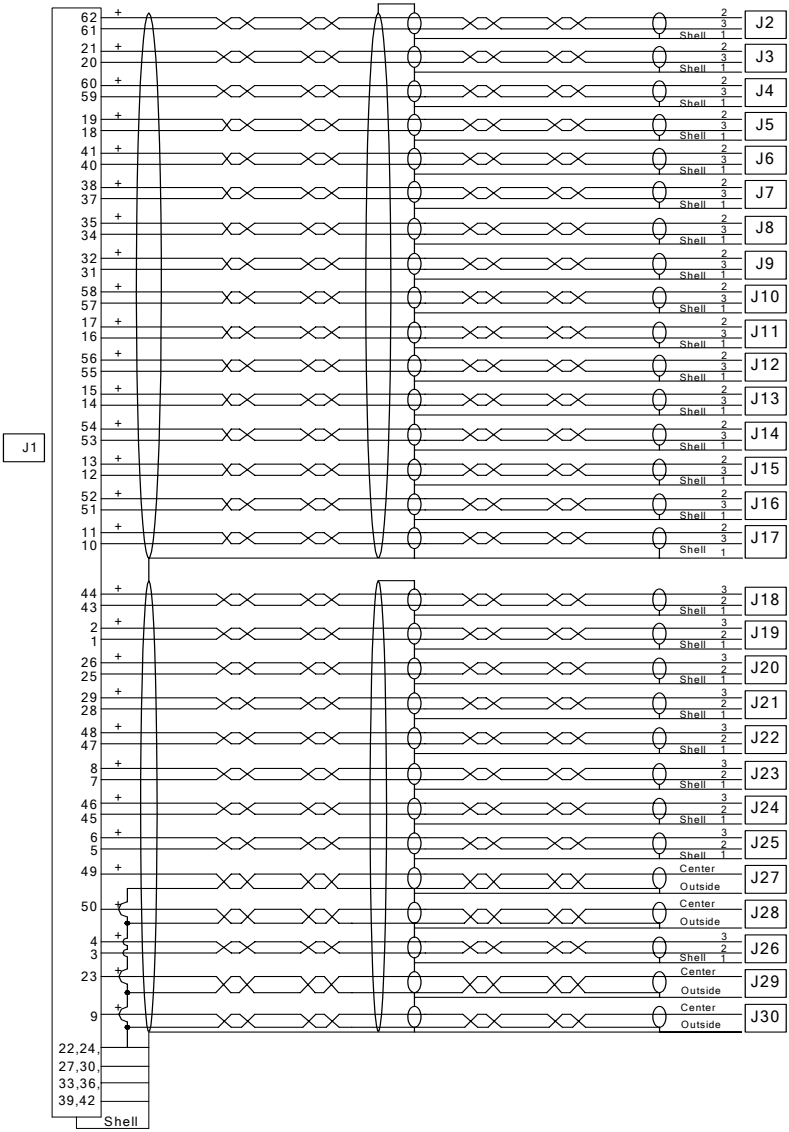
PCX882HR cable diagram

Schematic diagram of the cable delivered by Digigram*:



* Your cable may look different if it is not a Digigram cable.

PCX882HR wiring diagram



PCX881HR cable pinout

	Pin	Signal	Pin	Signal	Pin	Signal
Digital	1	AES/EBU 2 -	22	GND	43	AES/EBU IN 1 -
	2	AES/EBU 2 +	23	Vidéo IN	44	AES/EBU IN 1 +
	3	AES/EBU SYNC -	24	GND	45	AES/EBU OUT 3 -
	4	AES/EBU SYNC +	25	AES/EBU IN 3 -	46	AES/EBU OUT 3 +
	5	AES/EBU OUT 4 -	26	AES/EBU IN 3 +	47	AES/EBU OUT 1 -
	6	AES/EBU OUT 4 +	27	GND	48	AES/EBU OUT 1 +
	7	AES/EBU OUT 2 -	28	AES/EBU IN 4 -	49	Word Clock IN
	8	AES/EBU OUT 2 +	29	AES/EBU IN 4 +	50	Word Clock OUT
Analog	9	LTC IN	30	GND	51	NC
	10	NC	31	NC	52	NC
	11	NC	32	NC	53	NC
	12	NC	33	GND	54	NC
	13	NC	34	NC	55	NC
	14	NC	35	NC	56	NC
	15	NC	36	GND	57	NC
	16	NC	37	NC	58	NC
	17	NC	38	NC	59	NC
	18	NC	39	GND	60	NC
	19	NC	40	NC	61	NC
	20	NC	41	NC	62	NC
	21	NC	42	GND		

PCX882HR cable pinout

	Pin	Signal	Pin	Signal	Pin	Signal
Digital	1	AES/EBU 2 -	22	GND	43	AES/EBU IN 1 -
	2	AES/EBU 2 +	23	Vidéo IN	44	AES/EBU IN 1 +
	3	AES/EBU SYNC -	24	GND	45	AES/EBU OUT 3 -
	4	AES/EBU SYNC +	25	AES/EBU IN 3 -	46	AES/EBU OUT 3 +
	5	AES/EBU OUT 4 -	26	AES/EBU IN 3 +	47	AES/EBU OUT 1 -
	6	AES/EBU OUT 4 +	27	GND	48	AES/EBU OUT 1 +
	7	AES/EBU OUT 2 -	28	AES/EBU IN 4 -	49	Word Clock IN
	8	AES/EBU OUT 2 +	29	AES/EBU IN 4 +	50	Word Clock OUT
Analog	9	LTC IN	30	GND	51	OUT 7 -
	10	OUT 8 -	31	IN 8 -	52	OUT 7+
	11	OUT 8 +	32	IN 8 +	53	OUT 5 -
	12	OUT 6 -	33	GND	54	OUT 5 +
	13	OUT 6 +	34	IN 7 -	55	OUT 3 -
	14	OUT 4 -	35	IN 7 +	56	OUT 3 +
	15	OUT 4 +	36	GND	57	OUT 1 -
	16	OUT 2 -	37	IN 6 -	58	OUT 1 +
	17	OUT 2 +	38	IN 6 +	59	IN 3 -
	18	IN 4 -	39	GND	60	IN 3 +
	19	IN 4 +	40	IN 5 -	61	IN 1 -
	20	IN 2 -	41	IN 5 +	62	IN 1 +
	21	IN 2 +	42	GND		